Abstract Submitted
for the MAR16 Meeting of
The American Physical Society

Novel valley depolarization dynamics and valley Hall effect of exciton in mono- and bilayer MoS_2 T. YU, M. W. WU, University of Science and Technology of China, Physics Department — We investigate the valley depolarization dynamics and valley Hall effect of exciton due to the electron-hole exchange interaction in mono- and bilayer MoS_2. For the valley depolarization dynamics, in the monolayer MoS_2, it is found that in the strong scattering regime, the conventional motional narrowing picture is no longer valid, and a novel valley depolarization channel is opened. For the valley Hall effect of exciton, in both the mono- and bilayer MoS_2, with the exciton equally pumped in the K and K' valleys, the system can evolve into the equilibrium state with the valley polarization parallel to the effective magnetic field due to the exchange interaction. With the drift of this equilibrium state by applied uniaxial strain, the *momentum-dependent* valley/photoluminesence polarization is induced by the exchange interaction, which leads to the valley/photoluminesence Hall current. Specifically, the disorder strength dependence of the valley Hall conductivity is revealed. In the strong scattering regime, the valley Hall conductivity decreases with the increase of the disorder strength; whereas in the weak scattering regime, it saturates to a constant, which can be much larger than the one in Fermi system due to the absence of the Pauli blocking.

Ming-Wei Wu
University of Science and Technology of China, Physics Department

Date submitted: 04 Nov 2015 Electronic form version 1.4